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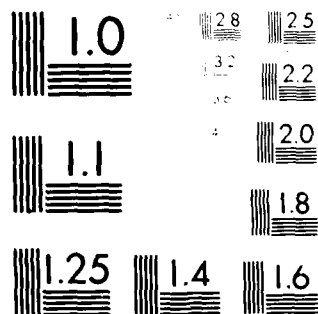
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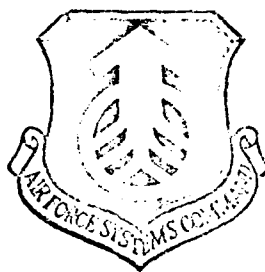
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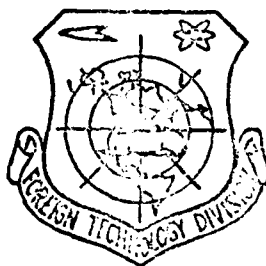
FOREIGN TECHNOLOGY DIVISION



THE "MIDNIGHT" WIND ON THE LAKES OF UPPER BAVARIA

by

H. Pruegel



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EDITED TRANSLATION

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THE "MIDNIGHT" WIND ON THE LAKES OF UPPER BAVARIA

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Berlin.

In the spring of last year a sailor, Captain Pott, Munich, who is familiar with the wind conditions on the lakes of upper Bavaria, brought to my attention a local wind on Starnberger Lake and Ammer Lake. He called this wind the "midnight wind" because it generally sets in shortly after midnight and particularly in high-pressure weather when clear skies and mild winds prevail in Upper Bavaria. It is a southerly wind which blows along the entire length of both lakes and is said to first occur slightly above the water surface so that it blows the sails but is not felt in the boat. Captain Pott reported that he more frequently sails from north to south during high-pressure weather situations, anchors there during the evening calm and returns after midnight ahead of the wind. Since up until now I have found no mention of this wind, an explanation will be given

here which perhaps will arouse a south-German colleague to make a more thorough study of this local wind.

Undoubtedly we are dealing here with a local wind, the occurrence of which is due to the orographic conditions. It is a daytime wind of the Alps which at this distance from the mountains, however, can be recognized somewhat more clearly at night than during the day. In his articles: "The daily circulation of the atmosphere in the area of the Alps,"¹ and "The daytime winds of the Alps"² E. Ekhart presented a detailed representation of the daily circulation in the Alpine region.

[FOOTNOTE: 'Forsch. und Fortschritte, 13, 210-212, 1937. END FOOTNOTE].

[FOOTNOTE: 'Die Naturwiss. 26, 21-27, 1938. END FOOTNOTE].

According to Ekhart's representation in the area of the Alps primarily two types of winds are elicited by the daily process of radiation: 1. The valley wind, and 2. the slope current. The valley wind, according to A. Wagner, is the consequence of the greater temperature fluctuation - with equal average temperature - in the

cross section of the valley compared to the plane. Thereby (analogous to the land and sea wind) during the day there is a current from the plane into the valleys and at night from the valleys onto the plane³.

[FOOTNOTE: ³Ibid, p. 22. END FOOTNOTE].

The thermal slope current arises from sunshine on the slope during the day as an ascending wind which is supplemented by a descending wind over the center of the valley. At night, on the other hand, the cold air flows down the slopes into the valley while over the middle of the valley the air rises.⁴

[FOOTNOTE: ⁴Ibid, p. 25. END FOOTNOTE].

In the mountain valleys both of these winds appear simultaneously and cannot be strictly separated from one another.

At the edge of the Alps moving toward the plane both wind causes will have the same effect. In our special case on Ammer Lake and Starnberger Lake we are dealing primarily with valley winds from the

Ammer- and Loisach valleys, which are intensified by the slope winds of the entire bordering edge of the northern Alps.

It is noteworthy that Captain Pott in sailing on both lakes was struck by the even south wind in the night but not by a corresponding north wind during the day. A simple consideration lets us see the reason for this. For one thing, the ascending slope current during the day on the northern slopes of the Alps, because of the shallow angle of incidence of the sun's rays, is not as strong as on the southern slopes whereas during the nighttime radiation there is no fundamental difference caused by the different compass bearing. For another, the effect of the different underlying ground on the thermal circulation is very pronounced during the day so that a lively warm air current particularly at some distance from the edge of the Alps can heavily mask the circulation between the mountains and the plane, while the cold air flowing down from the slopes at night will move northward, predominantly in troughs. The descending slope current, in spite of adiabatic heating, must be relatively cold, since the air flowing to the valley continues to cool from the radiation of the cooled ground.

Now we can very roughly estimate the velocity of the midnight wind. If we assume sunset in the summer to be at about 2000 (CET) then the wind must blow northward from the edge of the Alps with a

velocity of 1.5 to 2 m/s if it is to reach both of the lakes by midnight. Therefore, because of the lesser distance it should set in on Starnberger Lake sooner than on Ammer Lake (since the times were not exact this was not confirmed by Pott's observations).

The north-south orientation of the glacial tongue basins of both lakes provides the most favorable prerequisite for the flow of cold air from the slopes and out of the valleys to the north; the slight friction of the water surface lets the wind velocity decrease only slightly over the lakes, so that here the night wind blowing from the Alps can develop better than over the remaining parts of Upper Bavaria. If the sailors do not feel this wind in the boat itself it could be due to the fact that immediately over the water surface it is so strongly reduced that its velocity at the height of the passengers scarcely exceeds that of the boat.

Summary.

The "midnight" wind, a south wind which sets in on Starnberger Lake and Ammer Lake after midnight, confirms the articles by E. Ekhardt about the circulation in the area of the Alps.

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